Low uptake of FDG-PET in the liver – metastasis from mucinous adenocarcinoma of the rectum
Published on 14.03.2004

DOI: 10.1594/EURORAD/CASE.2873
ISSN: 1563-4086
Section: Abdominal imaging
Technique: CT
Technique: PET
Case Type: Clinical Cases
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Patient: 56 years, male

Clinical History:
Anterior abdominal mass. History of surgery for a mucinous adenocarcinoma of rectum 4 years ago.

Imaging Findings:
The patient was admitted for FDG-PET scanning as a follow-up 4 years after surgical resection of a mucinous adenocarcinoma of rectum. He presented recently with abdominal discomfort and palpable mass in the epigastrium. CT and colonoscopy follow-up two years after surgery showed no evidence of tumour recurrence.

Contrast enhanced CT scan showed a large hypodense tumor mass in the left liver lobe suspect for metastasis (Fig. 1).

Three heads gamma camera PET-scan (Philips, Marconi) was performed 45 minutes after injection of 259 MBq (7 mCi) of 18F-FDG. The PET scan revealed a hypometabolic FDG focus in the anterior abdomen. There was no pathologic FDG activity in the rest of the body, no signs of local tumour recurrence.

Coregistration and fusion imaging of the CT and PET images showed anatomical correlation between the two imaging modalities. There was discrepancy between the low metabolic FDG uptake in the PET-scan images and the tumor mass on CT.

The pathologic analysis confirmed polypous jelly-like rectal tumor, involving tunica muscularis and the pararectal space. Tissue specimen from the liver showed extracellular amorphous deposits of mucin similar with those found in rectum. The differential diagnosis of cholangiocarcinoma was excluded.

Discussion:
Positron Emission Tomography with 18F-fluorodeoxyglucose (FDG-PET) is a promising non-invasive diagnostic tool which has gained acceptance in modern oncology. It is a sensitive imaging modality for detecting functional disorders and tumor malignancies. Recent studies have proven the efficacy of FDG-PET in early detection and staging of various malignancies [1]. We report a rare case of a low metabolic-uptake rate of FDG in a patient operated for rectum cancer.

The case illustrates a mismatch between low metabolic, low glycolitic FDG-uptake in the liver and hypodense tumour on CT in a patient previously operated for rectal cancer with suspicion for a metastasis. Tumour validation by using FDG-PET is based on estimating the glycolitic rate of malignant tumours, which can be used for diagnosis as well as monitoring changes in tumour glucose metabolism during treatment. Most malignant tumours have increased glucose metabolism compared to normal tissue but so do benign processes such as inflammation either. The glycolitic rate of malignant tumours is dependant on different physiologic conditions. The FDG uptake is assumed to
correlate with the glucose uptake in the cells but it is also dependant on cells' own energy expenditure. Low FDG uptake can be expected in tumours with high cell differentiation and low mitotic index. Mucinous tumour cells have such low energy expenditure. Normal liver has a higher metabolic rate of fluorodeoxyglucose, compared to the rate of metabolism of FDG in other organs. 18F-FDG-PET scanning for detection of liver metastases can provide important supplemental diagnostic information for evaluation of tumour metastases but one has to keep in mind that low metabolic rate is not always consistent with benign lesions.

**Differential Diagnosis List:** Liver metastases from mucinous adenocarcinom in rectum.

**Final Diagnosis:** Liver metastases from mucinous adenocarcinom in rectum.

**References:**


Description: Contrast-enhanced, multislice CT in portal venous phase shows large hypodense tumoral process in the left liver lobe. Origin:
Description: FDG-PET image of upper abdomen reconstructed with CT-based attenuation correction shows a region of decreased metabolic activity with correlating CT localization of a hypodense tumour mass in the left liver lobe. Origin:
**Description:** 18F-FDG PET isotope scanning of thorax and upper abdomen shows hypometabolic structure anterior, in the middle of the abdomen. The hypermetabolic focus seen on the left is normal glucose uptake in the myocardium. **Origin:**

**b**

**Description:** PET scanning of abdomen shows normal FDG accumulation in the bladder, no signs of local tumour recurrence. **Origin:**